FLIGHT PLAN WALKTHROUGH WITH RATIONALE

Station Activities Performed Prior to Shuttle Docking

- Prepacking
- ULF1.1 timeline review
- RPM photography training
- SSRMS checkout & move from MBS to Lab PDGF
- ITCS sampling
- VDS routing
- Node 1 nadir CBM checkout
- Airlock prep for EVA ops, EMU battery recharge, METOX regen, Safer checkout, and EVA tool config
- CBCS install and checkout
- PMA prep for docking

Generic Activities/Constraints

- Daily log entries for DSO 634 and saliva samples for DSO 493 are collected every morning at wakeup.
- A total of 13 CWCs and 3 PWRs are filled and transferred to ISS. CWCs and PWRs can not be filled at the same time since EECOM would not be able to tell how much water is in each. PWR fills can not occur during supply nozzle dumps.
- An estimated ~100 man-hours are required for MPLM generic transfer, and 30 hours for middeck transfer. Powered payload, EVA equipment, and water bag transfers are scheduled separately from generic transfer. MS3 (loadmaster), FE-2 (b/u loadmaster), and STS CDR will perform a transfer review every docked morning to review the latest uplinked transfer list. A transfer tagup between crewmembers and a transfer call to MCC are scheduled for MS4, FE-2 and/or STS CDR every docked day starting approximately 3 hours prior to sleep.
- All nominal EVAs are performed using the ISS airlock and the CEVIS exercise prebreathe protocol. The Shuttle crew is prime for all SSRMS and EVA tasks. MS1 and MS4 are EV2 and EV1, respectfully, PLT is IV1, ISS FE-1 is IV2, and MS2 and MS3 are SSRMS operators. CDR will perform any SRMS tweaks for camera views if necessary although none are scheduled.
- The SRMS is used for OBSS operations and EVA camera views. The SSRMS is used for MPLM operations, OBSS survey camera views, and EVA robotics operations. SSRMS operators are MS2 and MS3 and SRMS operators are CDR and MS1. CDR, MS1, MS2, and MS3 are prime for OBSS/SRMS survey operations.
- Water dumps will not be performed in the docked attitude. The Shuttle will maneuver the stack to the dump attitude and hold attitude control during all dump events.
- TFLs:
    - TFL 192 is required for TCS during rndz tool c/o, rendezvous, and undocking. SSV Outrate = 3.
    - TFL 184 is required for MPLM environmental checks and is the default while undocked. SSV Outrate = 3.
    - TLF 199 is used while docked. SSV Outrate = 2.
    - TFL 161 is required for FCS C/O.
- Matrix aligns are required during the docked period because there are no stack maneuvers scheduled for stars of opportunity.

Flight Day 1

- Setup will be completed for the KFX PGSC, router, color printer, and the two A31Ps for the ET umbilical photos and WLES data. The crew will download the ET photos and WLES data to the A31Ps as soon as possible so OCA can downlink them for ground processing. The crew will also load ET handheld camera still photos to the KFX machine for downlink. The remainder of the network setup is scheduled on FD2.

- The ET handheld camera video will be downlinked during Ku coverage.
- The PI, NC-1, and post burn -ZLV attitudes are biased to improve Ku for quick downlink of ET photos and video and WLES sensor data.
- Approximately two hours of P/TV01 setup are completed. This activity sets up all photo/TV equipment needed for the FD2 OBSS survey.
- APCU 1 and OIU are activated so MCC can perform an MPLM environmental check. The FD1 check is a full check with fan activation.
- RMS init is completed after which MCC will uplink the payload IDs. Once MCC has completed that activity, The arm is powered up and the Payload I.D.s are verified. The RMS init includes deployment of both port and starboard MPMs.
- WSB DTO is performed by starting APU 3 when the APU is at a good temperature per real time call (~3:45 MET). Elevon park is also included in this procedure since both require Ops 8. NC-1 was moved late to accommodate the Ops 8 transition.
- FRED setup is performed to provide operational relief to the SRMS operators.
- Actilight watches are donned for DSO 634 just prior to the first sleep period.

Flight Day 2

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- RMS C/O must be performed prior to beginning the OBSS surveys. RMS powerup is not required as the arm was powered overnight.
- All starboard wing, nose cap, and port wing RCC are surveyed with the OBSS. Three crew are required continuously during the survey with two performing OBSS/SRMS ops and one monitoring the LDRI and situational awareness cameras. Only two crew are required during unberthing and berthing (non laser ops). The survey is scheduled to continue through the night passes due to time constraints, but the crew may elect to pause if the night time visuals are not sufficient. An LDRI 3D calibration during OBSS unberth requires real-time Ku to evaluate laser accuracy. Real-time Ku is not required during the flat-field calibration during the maneuver to the first survey. Each 90-minute surface scan requires as much real-time Ku as possible to downlink DTV. Biased -ZLV attitudes are scheduled to maximize Ku. Replay of survey data not obtained real-time is scheduled prior to presleep. INCO will provide LOS times in order to help the crew cue the tapes. Note: TDRS Z does not have the capability for DTV, thus can not be used to downlink critical damage data.
- Two EMUs are checked out by the PLT and the two EVA crewmembers.
- The two EMUs are removed from the Shuttle airlock and temp stowed prior to docking to facilitate PMA access/transfers after docking.
- Manual FC purge is scheduled early to avoid survey because of possible contamination on the LDRI.
- PGSCs are set up if not completed on FD1.
- APCU 1 is activated so MCC can perform an MPLM environmental check (pressure check only).
- The airlock fan is turned off for the mission to save cryo per SDTO 12004-U. It is activated before ODS ring extension to provide cooling to docking avionics, and will remain activated during EMU checkout to provide airflow to the crew while they're working in the airlock.
- Rendezvous prep activities are performed including centerline camera install, rendezvous tool checkout, ODS ring extension, and rendezvous burns. Centerline camera install is required prior to survey because the same monitor is used for the camera cross hair check as for LDRI video. Rendezvous tool checkout must be performed after the OBSS surveys are complete due to the fact that RSAD will be running continuously on the prime RPOP machine. Rndz tool c/o must be decoupled with APCU on for MPLM checks due to a TFL conflict. Docking ring extension can not be performed until the starboard survey is complete due to clearances. NC2 is scheduled early in post sleep and NC3 is scheduled late to avoid the survey.
- P/TV01 setup is completed.
- Middeck transfer prep is scheduled to prepare items for transfer to ISS.
- CWC fill equipment is set up but no bags are scheduled to be filled until FD04.

- The maneuver to the next day's water dump attitude is future loaded to allow the dump to begin early on FD3 and minimize impact to the crew's post sleep.
- Sleep begins at MET 1/04:00, two hours earlier than on launch day, to shift the crew for an early docking and set up the sleep cycle to support EOM landing.

Flight Day 3

- A simo water dump is performed to minimize the amount of waste water dumped during the docked mission. The maneuver for the dump is future loaded on FD2. The dump is scheduled at close to the NH burn as practical to minimize burn planning excursions.
- APCU 1 is activated so MCC can perform an MPLM environmental check (pressure check only).
- An SRMS end effector survey of the crew cabin is performed. Real-time Ku is required to downlink survey video, therefore the retrograde water dump attitude is +YVV with a pitch bias to maximize Ku. Replay of any survey data not obtained real-time will occur as soon as possible before the Ku is taken to radar mode. The SRMS must be in pre-radle prior to NH (called out in survey procedure), and will remain in pre-cradle through docking.
- FIT food tray changeout will be performed. No other actions are required for this payload.
- The condensate collection hardware is setup and a collection is initiated. Two bags will be collected during the docked timeframe and will be discharged overboard on end-of-mission - 1 day.
- As part of the rendezvous procedures, the crew will perform a 360º Rbar pitch maneuver while the ISS crew takes digital photos of the lower and upper tile surfaces. The ISS crew will load these photos onto the network so that ISS OCA can downlink them as soon as Ku is available.
- After docking, leak checks are performed on the PMA and ODS, the ODS is prepared for ingress (centerline camera removed and ducting prepared), and hatches are opened. All crew will participate in a 25-minute safety briefing. The airlock fan is bypassed and deactivated as part of the post docking procedures.
- The Shuttle will maneuver the stack to the docked TEA attitude (STS biased -XLV -ZVV) after rates are damped. Once in attitude, the crew will perform attitude control handover from Shuttle to US CMG TA.
- The PGSC network is reconfigured from the rendezvous configuration to the EVA/RMS configuration to support OBSS and SRMS operations.
- During the EVA prep for transfer procedure, the crew will pack EMUs 1/2 and EVA tools for transfer to ISS.
- EVA tools (such as the CIPAAs) to be used during the TPS DTO EVA are transferred to ISS.
- The OBSS is unberthed by the SSRMS and handoff from the SSRMS to the SRMS is completed. Two SRMS crew and two SSRMS crew are required for this entire operation. ISS FE-1 will provide SSRMS support since this is the first use of the SSRMS by the Shuttle crew. During SSRMS unberth of the OBSS and maneuver to handoff position, the SRMS cameras will provide clearance monitoring. After handoff is complete, the SSRMS is maneuvered to a position for an overnight MCC commanded petal deploy and seal inspection on the Node 1 Nadir ACBM. The SRMS/OBSS will remain deployed and powered for the entire docked mission.
- Augementation is complete once the IELK is installed and checked out. A SOKOL leak check is scheduled to complete the IELK installation.
- The connections for ROOBA are performed and a gross leak check for overnight is initiated (Part 1).

Flight Day 4

- APCU 1 is activated so MCC can perform an MPLM environmental check (pressure check only) prior to MPLM unberth.
- The ROEU is disconnected, the PRLAs unlatched, and the MPLM is unberthed from the payload bay using the SSRMS and installed onto ISS Node 1 Nadir port. MS1 and MS4 will provide camera views (P/TV06) to the SSRMS operators until they are needed for the

PCMB inspection. During MPLM install and in the low hover position, MS1 and MS4 will use the PLB cameras to perform a PCBM seal inspection. MS1 and MS4 will transition to the ISS Lab for the Node 1 CBM Verify Pre-mate Status while the PLT will continue P/TV06 operations for the SSRMS operators.

- CBMs are closed after MPLM installation is complete. No exercise is allowed once the MPLM is moved from Pre-Install position until bolts are acquired. The one hour CBM bolt loading must be completed by MCC before the vestibule can be pressurized. The CBCS is removed and the equipment needed for vestibule config is set up.
- STS CDR and ISS CDR will continue with vestibule depress, vestibule config for ingress, MPLM activation parts I and II, MPLM ingress, and MPLM setup. Once the CDR is finished with Activation, he will join ISS CDR in the removal of the CPAs. One safer stowed in MPLM is transferred in preparation for the FD06 checkout.
- A placeholder is scheduled for docked OBSS survey. This may be used to complete the nominal FD2 RCC survey if it runs long, or to perform a focused inspection on areas where tile or RCC damage is suspected. The SSRMS must be based on the MBS for situational awareness views, so MS2 and ISS FE-1 will perform a walkoff of the SSRMS to the MBS (MBS GRAPPLE) and will maneuver the SSRMS to a viewing position prior to the survey.
- Several activities are scheduled throughout the day for the EVs and IVs to prepare the EMUs and airlock equipment for EVA 1. The two EVs will familiarize themselves with CEVIS as used during EVA prep prebreathe. The EMUs are transferred to the ISS airlock and reconfigured as necessary with parts from ISS. The EVA still camera is set up, the equipment lock and EVA tools are configured, the REBA hardware is checked out, ROOBA leak check and checkout part 2 and the ROOBA P/B test are performed. A one hour EVA procedure review is conducted between all crewmembers involved with the EVA including the CDR, EVs, IVs, and SSRMS and SRMS operators (all except ISS FE-2).
- N2 transfer from the Shuttle to the ISS airlock tanks is initiated.
- Two CWCs are filled.
- MDDK transfer is performed as available.
- An A/G only PAO event is scheduled because all available Ku is needed for downlink of LDRI data.
- SOKOL Dry and SOKOL glove stow activities are scheduled but may be removed if deemed unnecessary by the Russian Planners.

Flight Day 5

- EVA1 tasks include: DTO 849 OBSS/SRMS loads characterization with EVA crewmember.
- The crew will perform an SSRMS walkoff from the MBS to the Lab PDGF prior to egress. The SSRMS is maneuvered to the EVA 2 position after all EVA tasks are complete.
- Post EVA H2O recharge is delayed until the following day to maximize presleep. BSA battery charging is initiated.
- Two CWCs are filled and transferred to the ISS.
- MPLM transfer continues by ISS crewmembers. Based on crew input, this will not begin until EVA prep is complete.

Flight Day 6

- EMU water recharge termination is performed. EMU METOX/LiOH/Battery replacement procedure is performed with LiOH being installed into the EMUs. The crew will prepare for EVA 2 with equipment lock prep, still camera set up, and EVA tool configBSA battery charging is terminated.A one-hour EVA procedure review is conducted between all crewmembers involved with the EVA including the CDR, EVs, IVs, and SSRMS and SRMS operators (all except ISS FE-2).
- The CIPAA hardware is prepared for the following day's EVA.
- The SAFER that was brought in the MPLM is checked out for the ISS.
- Two CWCs are filled and transferred to the ISS.
- MPLM transfer continues.

- The MELFI rack transfer is scheduled separately from MPLM transfers. It requires some MPLM transfer after ingress and requires two crewmembers.
- WLES may require a battery changeout mid-mission on this day.
- Shuttle mid-mission reconfigurations are completed.
- The crew conference and photo are scheduled using Shuttle assets.

Flight Day 7

- EVA 2 specific tasks include: ISS ORUs and CIPAA DTO.
- The crew will utilize the SSRMS based on the Lab PDGF for EV worksite access. The SSRMS is maneuvered to the mated MPLM pregrapple position after all EVA tasks are complete. The OBSS will be mnvred to the MPLM viewing position.
- Post EVA: H2O recharge and EMU METOX/LiOH/battery replacement are delayed until the following day to maximize presleep. FRAM doff and CIPAA w/HMG stow requirements result in an SCSC violation of 15 minutes.
- Two CWCs and one PWR are filled.
- MPLM transfer continues on a non-Lab/SSRMS interference basis.

Flight Day 8

- Wastewater and PWR dumps are performed. The crew will perform attitude control handover from CMGs to Shuttle before the dump and back to CMGs after the dump.
- The CIPAA is cleaned and stowed for entry.
- A US PAO event is scheduled using Shuttle assets.
- Two CWCs and two PWRs are filled.
- MPLM transfer continues.
- The CEVIS R&R removes the parts of the current exercise machine and places them in the MPLM for return.
- The MPLM racks are configured for entry. All MPLM transfer is complete at this point.
- N2 transfer from the Shuttle to the ISS airlock tanks is terminated.
- Four hours of off duty are scheduled for the Shuttle crew with the remainder scheduled post undock. PFCs are scheduled for each crewmember during off duty.Off duty is not required for the ISS crew. They will perform CPA install and ISS housekeeping items during this time.

Flight Day 9

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- Transfer 3rd EMU to ISS. Perform EMU METOX/LiOH/Battery Replacement installing LiOH into the EMUs. Perform EMU checkout on the 3rd EMU. This EMU has the advanced C&W system. After this checkout is complete, the EMU needed on STS are transfered back to the shuttle followed by an EVA tool stow.
- STS CDR and ISS CDR will perform MPLM egress, deactivation, vestibule configuration, and vestibule depress.
- After vestibule depress, the crew will perform Node 1 Nadir CBM demate, and uninstall and reberth the MPLM in the PLB using the SSRMS. No exercise is allowed during CBM demate and MPLM uninstall. The MPLM heaters are turned on for about 4 hours. APCU 1 is activated so MCC can perform a full environmental check.
- Rendezvous tool checkout is completed to support undock. Rndz tool c/o must be decoupled with APCU on for MPLM checks due to a TFL conflict.
- The Shuttle O2 prebreathe equipment is torn down.
- The OBSS handoff from the SRMS to the SSRMS is completed and the SSRMS will reberth the OBSS in the PLB. Two SRMS crew and two SSRMS crew are required for this entire operation. During SSRMS maneuvering after OBSS grapple and during reberthing, the SRMS cameras will provide clearance monitoring. After the OBSS is reberthed, the SSRMS is maneuvered to an undock viewing position and the SRMS is powered down.
- Two CWCs are filled and transferred.
- MDDK transfer concludes.

- One U.S. PAO event is scheduled using Shuttle assets.
- P/TV08 ISS external survey is performed over a daylight pass.

Flight Day 10

- The crew will close the hatch between vehicles, perform an ODS leak check, and install the centerline camera.
- The formaldehyde monitoring kit (FMK) deploy is performed. It must be stowed after 48 hours.
- The crew will perform handover of attitude control from CMGs to STS and maneuver to undock attitude.
- Undocking with a flyaround is performed.
- Illuminators are deactivated.
- APCU 1 is activated so MCC can perform an MPLM environmental check (pressure check only).
- The centerline camera is removed from the ODS.
- The airlock fan is deactivated.
- The comm system is switched to comm string 1 to check out that string.
- A maneuver to -ZLV +YVV attitude is performed soon after undocking and a simo dump is performed once ISS is out of range for dump particle recontact.
- Approximately 2 hours of off-duty is scheduled for all crewmembers.

Flight Day 11

- APCU 1 is activated so MCC can perform an MPLM environmental check (pressure check only). Once this last MPLM check is complete, the OIU is deactivated.
- Standard day before entry activities are performed: FCS checkout, RCS hotfire, PILOT ops, deorbit briefing, L-1 comm checks, cabin stow, entry video setup, SSV deact, ergometer stow, Ku stow, PGSC stow, and MFX setup.
- The starboard and port MPMs are stowed.
- One U.S. PAO event is scheduled for all crewmembers.
- EVA hardware stow and post EVA entry prep are performed.
- Condensate dumps for two bags are performed.
- A FES dump is performed for 2.5 hours.
- The WLES A31P and equipment is stowed.
- The comm system is switched back to comm string 2 after 24 hours.

Flight Day 12

- Standard entry day activities are performed: IMU align, GIRA stow, TEPC stow, air sample, OCAC stow, PGSC and printer stow, group B powerup, and mnvr to -XSI.
- The DSO actilight watches are stowed after final log.
- The formaldehyde monitoring kit (FMK) stow is performed after 48 hours of deployment.
- Deorbit prep and landing at KSC.

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Space Shuttle Program
FLIGHT DATA FILE

JSC-48000-121
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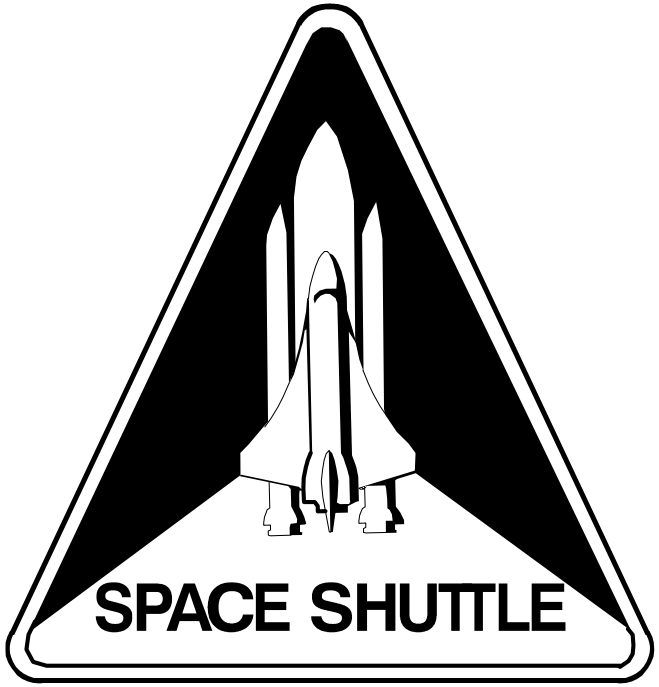

FLIGHT PLAN

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Flight Cover (trim bottom to expose tabs)